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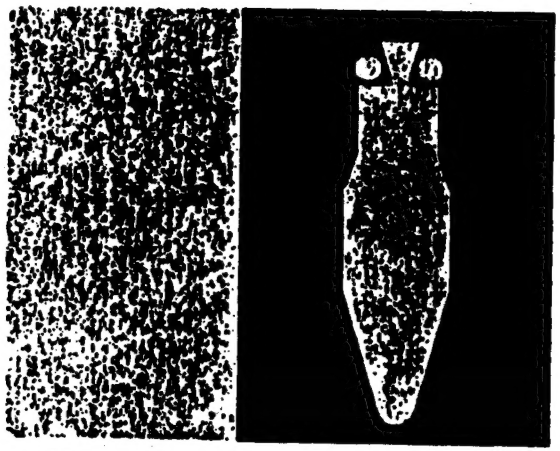

SAMOS

SATELLITE RECONNAISSANCE SYSTEM

PHOTOGRAPHIC
ELECTRONIC

REQMTS PROVIDED BY:
UNITED STATES INTELLIGENCE BOARD
-SATELLITE INTELLIGENCE REQMTS COMMITTEE

DEVELOPMENT AGENCY
UNITED STATES AIR FORCE

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604018

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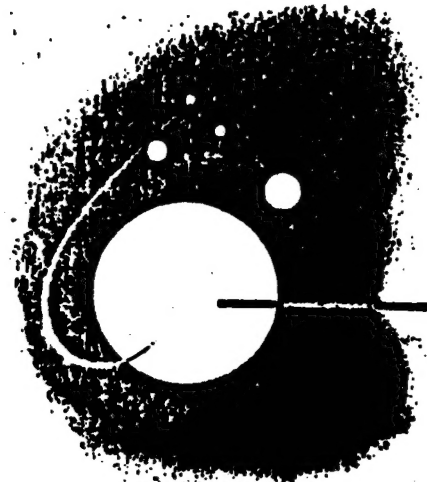
AF-59 0?00 17235

SAMOS SYSTEM ELEMENTS

Eisenhower Library

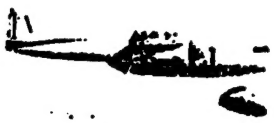


SATELLITE LAUNCH

LAUNCH
ASSEMBLY AND CHECKOUT
GROUND SUPPORT EQUIPMENT

VEHICLE

AIRFRAME
PROPULSION
GUIDANCE AND CONTROL
VEHICLE TELEMETRY
VEHICLE COMMAND EQUIPMENT
ORBIT CONTROL SYSTEM



RECOVERY FORCE

DATA ACQUISITION

TRACKING AND ACQUISITION STATION

VEHICLE TRACKING
TELEMETRY
COMMAND
DATA ACQUISITION

SATELLITE TEST CENTER

SYSTEM CONTROL CENTER
DATA DISPLAY AND ASSESSMENT
DATA DISTRIBUTION TO USERS

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SAMOS CONCEPT

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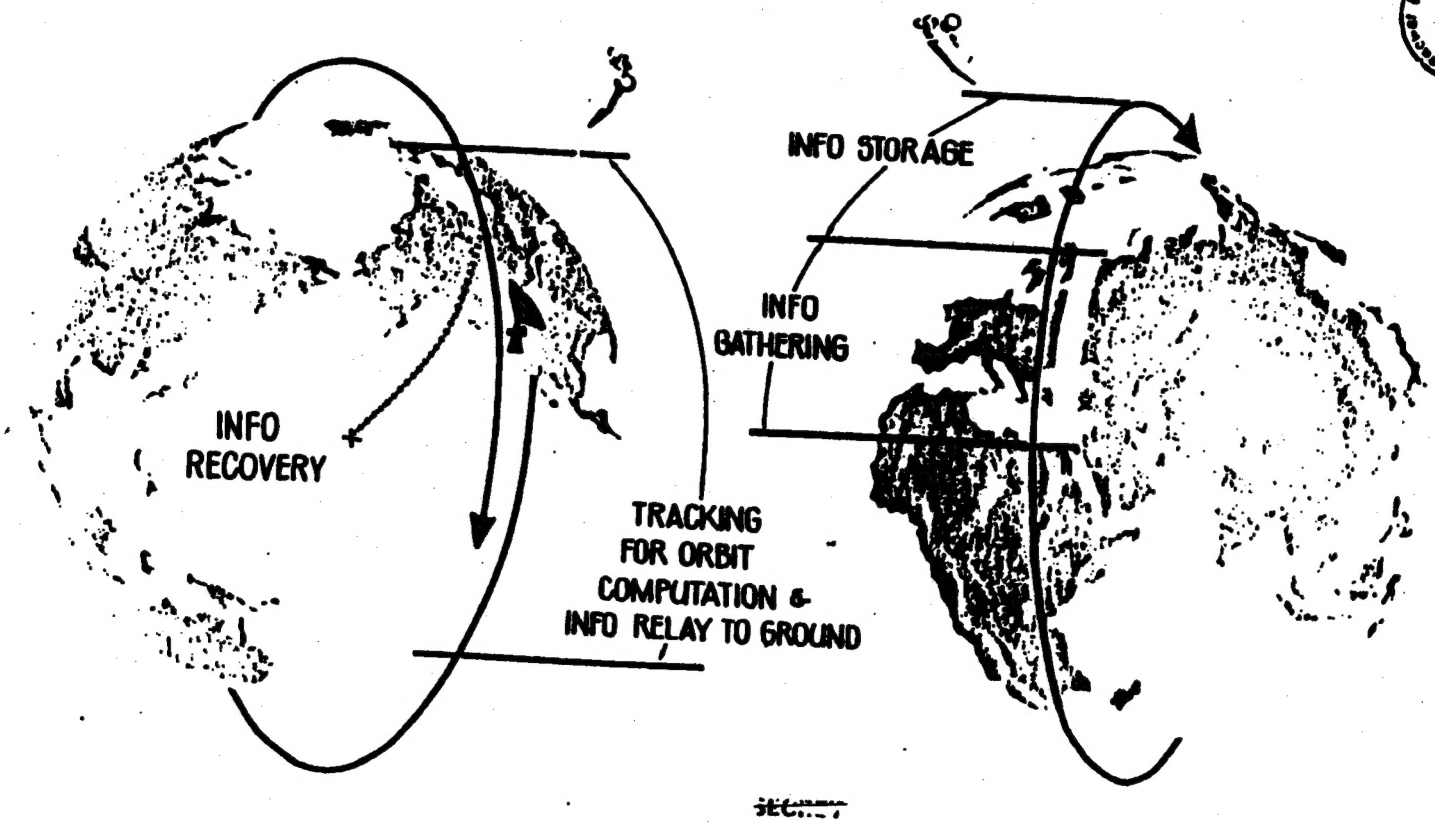
150-300 S. MI. ALTITUDE - PHOTO & ELECTRONIC



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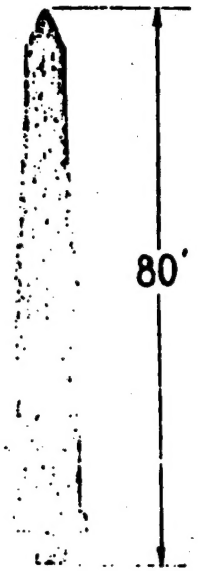
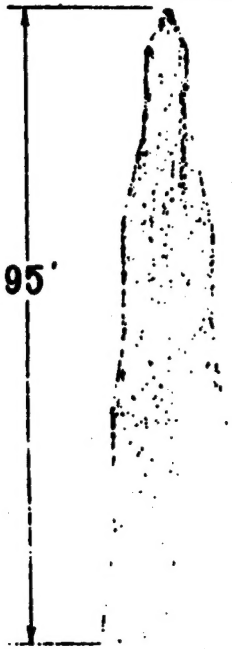
TYPICAL SIZE AND WEIGHT

AU (1000) 2677

THOR
AGENA B





ATLAS
AGENA B

AGENA B	EMPTY WEIGHT	1,400	AGENA B	EMPTY WEIGHT	1,400
	LAUNCH WEIGHT	16,150		LAUNCH WEIGHT	19,800
THOR	EMPTY WEIGHT	8,830	ATLAS	EMPTY WEIGHT	14,150
	LAUNCH WEIGHT	107,170		LAUNCH WEIGHT	258,130
TOTAL BOOSTER AND AGENA WEIGHT AT LAUNCH		123,320 LBS	TOTAL BOOSTER AND AGENA WEIGHT AT LAUNCH		277,930 LBS

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SAMOS

- A SATELLITE RECONNAISSANCE SYSTEM IS COMPLEX WITH MANY ADVANCED DEVELOPMENTS REQUIRED, BUT IT CAN BE MADE TO WORK

- DEVELOPMENT PROGRESSION REQUIRED DUE TO PRESENT STATE-OF-THE-ART LIMITATIONS:

  PHOTOGRAPHIC: 20' GROUND RESOLUTION ——✓ 3' OR LESS

  ELECTROMAGNETIC: SIMPLE DIGITAL ————✓ COMPLEX DIGITAL & ANALOG

  ACTIVE LIFE: 1 WEEK —✓4 MONTHS ——✓ 1 YEAR

- THE DEVELOPMENT PROGRAM WILL INCLUDE FAILURES IN THE COURSE OF THE DEVELOPMENT EFFORT

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INTELLIGENCE REQUIREMENTS FOR SAMOS

PRIORITY I

PHOTOGRAPHIC - LOCATION OF OPERATIONAL ICBM SITES

PRIORITY II

A. PHOTOGRAPHIC - DESCRIPTIVE INFORMATION ON HIGH PRIORITY TARGET LIST ITEMS

B. ELINT - ANTI-BALLISTIC MISSILE RADARS, MISSILE TELEMETRY, EARTH TO SATELLITE TRANSMISSIONS

PRIORITY III

A. PHOTOGRAPHIC - TECHNICAL CHARACTERISTICS OF HIGH PRIORITY LIST ITEMS

B. ELINT - OTHER RADARS SUCH AS EARLY WARNING, AAA, GCI, SHORAN, SAM

PRIORITY IV

COMINT - TO THE EXTENT DEVELOPMENT PROVES FEASIBLE

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OUTLINE REQUIREMENTS
USIB - 6 JULY '60

PHOTOGRAPHIC

"GENERAL SEARCH" - 20' "RECOGNIZABILITY"

- 1ST PRIORITY - TO LOCATE SUSPECTED ICBM LAUNCH SITES BETWEEN NOW & END OF 1962 — E-2 (LIMITED SEARCH CAPABILITY) 1ST FLT - APR '61

  REPETITIVE SEARCH - ONCE EACH MONTH INITIALLY — E-6 1ST FLT - JAN '62

"DESCRIPTIVE" INFORMATION - 5' "RECOGNIZABILITY"

- 2ND PRIORITY - COVERAGE OF HIGHEST PRIORITY TARGET CATEGORY & SUSPICIOUS LOCATION — E-5 1ST FLT - SEPT '61

  LAUNCH & CONTROL OF THESE - MISSION ON SHORT NOTICE

[redacted]

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OUTLINE REQUIREMENTS
USIB - 6 JULY '60

PHOTOGRAPHIC

"GENERAL SEARCH" - 20' "RECOGNIZABILITY"

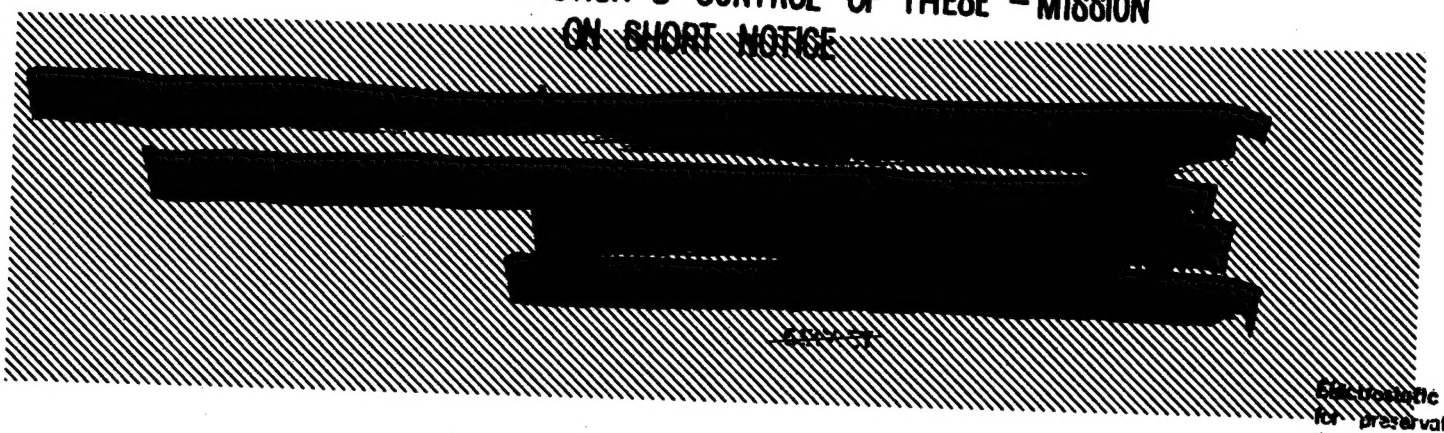
- 1ST PRIORITY - TO LOCATE SUSPECTED ICBM LAUNCH SITES BETWEEN NOW & END OF 1962

REPETITIVE SEARCH - ONCE EACH MONTH INITIALLY

"DESCRIPTIVE" INFORMATION - 5' "RECOGNIZABILITY"

- 2ND PRIORITY - COVERAGE OF HIGHEST PRIORITY TARGET CATEGORY & SUSPICIOUS LOCATION

LAUNCH & CONTROL OF THESE - MISSION ON SHORT NOTICE



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OUTLINE REQUIREMENTS

USIB · 6 JULY 60

ELINT/COMINT

LESS PRIORITY AND VALUE THAN PHOTOGRAPHIC RECONNAISSANCE. BUT SHOULD BE CARRIED ON WITH HIGHEST PRIORITY. SHORT OF INTERFERING WITH PHOTOGRAPHY

IN VIEW OF THE UNCERTAINTIES OF A FULLY DEVELOPED ELECTRONIC RECONNAISSANCE SYSTEM, THERE IS A RELUCTANCE TO SPECIFY DETAILED REQUIREMENTS FOR THE SHORT TERM

MOST IMPORTANT IS THE SEARCH FOR EMISSIONS ASSOCIATED WITH ANTI-BALLISTIC MISSILE SYSTEMS

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EXAMPLE OF TARGET THAT MAY BE IDENTIFIED AT DIFFERENT GROUND RESOLUTION

100 ft — CITIES, FORESTS, RAIL ALIGNMENT, INDUSTRIAL COMPLEXES, MAJOR MILITARY INSTALLATIONS, AND LARGE BODIES OF WATER.

20 ft — COMPONENTS OF MILITARY INSTALLATIONS, AIRBASE RUNWAYS, SUBMARINE BASES, MAJOR SURFACE TO AIR MISSILE SITES, ATOMIC ENERGY INSTALLATIONS, BALLISTIC MISSILE SITES, SURFACED SUBMARINES, LARGE AIRCRAFT AND MISSILE LAUNCHING PADS, IDENTIFICATION OF MAJOR SOVIET NAVAL FORCES.

10 ft — LARGE AIRCRAFT AND KNOWN MISSILE CARRYING SUBMARINES, LOCATING SPECIAL WEAPONS, ABOVE GROUND ICBM AND IRBM FACILITIES, CAPACITY OF MILITARY STORAGE FACILITIES, IDENTIFICATION OF NAVAL SHIPS BY TYPES.

5 ft — DETAILED INFORMATION ON MOST MILITARY AND INDUSTRIAL INSTALLATIONS, ALL AIRCRAFT, GROUND FORCES EQUIPMENT AND DISPOSITION, LARGE MISSILES, AAA SITES, STRUCTURAL SHIPBOARD CONFIGURATIONS, LEVELS OF MILITARY ACTIVITY.

1 ft — DETAILED TECHNICAL INFORMATION ON AIR, NAVAL AND GROUND FORCES EQUIPMENT AND INDUSTRIAL PRODUCTION PROCESSES.

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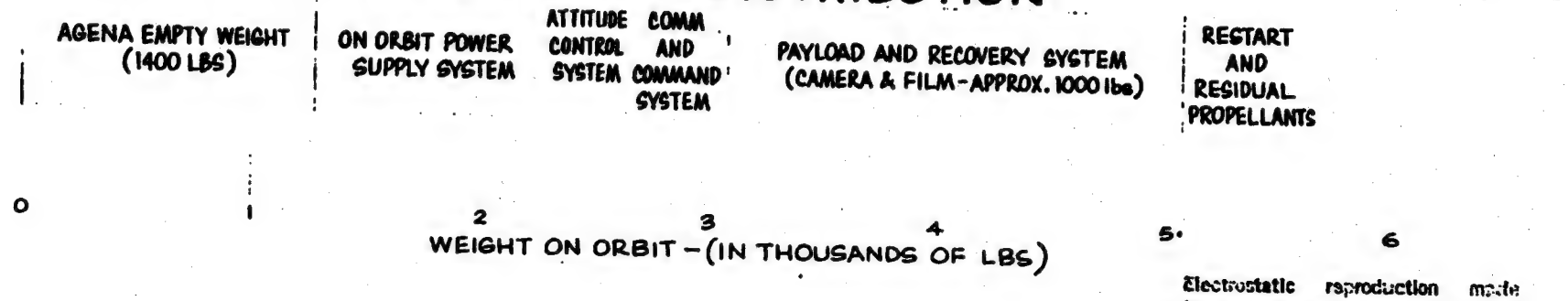
ORBITAL CAPABILITY

VEHICLE	WEIGHT ON ORBIT AT 150 N. MILES ALTITUDE:	WEIGHT ON ORBIT AT 261 N. MILES ALTITUDE:
THOR & AGENA B	2800 LBS	2600 LBS
ATLAS & AGENA B	6500 LBS	6200 LBS

SYSTEM	WEIGHT ON ORBIT AT 150 N. MILES ALTITUDE:	WEIGHT ON ORBIT AT 261 N. MILES ALTITUDE:
E-5	5700 LBS	4300 LBS
E-1 / F-1		4100 LBS
F-2		4400 LBS
F-3		4900 LBS
E-2		

E-5 WEIGHT DISTRIBUTION



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CHARACTERISTICS
PHOTO PAYLOAD SYSTEMS

SYSTEM	DATA RETRIEVAL METHOD	RESOLUTION	SWATH WIDTH	OPERATING LIFE	MAX DAILY COVERAGE MILLION SQ N MI	TOTAL COVERAGE MILLION SQ N MI
E-1	READOUT	100′	87 N MI	10 DAYS	.57 (1 STA)	5.7
E-2	READOUT	20′	14.5 N MI	4 MOS	.033 (2 STA)	4.0
E-5	RECOVERY	5′	53 N MI	15-30 DA	0.6	4.9
E-6	RECOVERY	8′	200 N MI	5 DA	3.0	14.0

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VISUAL SENSORS CAPABILITIES

E-1 COMPONENT TEST PAYLOAD	E-2	E-5	E-6
TERRAIN FEATURES & COMMUNICATION CENTERS	IDENTIFY FEATURES & COMPLEXES	LEVEL OF MILITARY ACTIVITY	IDENTIFY FEATURES & COMPLEXES
AIRFIELDS	LARGE AIRCRAFT	IDENTIFY AIRCRAFT	LARGE AIRCRAFT
HARBOR FACILITIES & SHIPPING	SUBS-PIERS-SUPPORTING FACILITIES	IDENTIFY TYPES & USES ie, SHIPBOARD MISSILE FACILITIES	SUBS-PIERS SUPPORTING FACILITIES
LOCATE INDUSTRIAL COMPLEXES	IDENTIFY INSTALLATIONS	IDENTIFY MATERIAL PRODUCTION	IDENTIFY INSTALLATIONS
SUSPECT CONSTRUCTION OF MISSILE SITES	LOCATE MISSILE SITES	IDENTIFY TYPE OF MISSILE SITE	LOCATE MISSILE SITES
FIRST FLIGHT - SEP 60 3 FLIGHTS STRIP CAMERA 6" FOCAL LENGTH	FIRST FLIGHT- APR. 61 3 FLIGHTS STRIP CAMERA 36" FOCAL LENGTH	FIRST FLIGHT- SEPT. 61 7 FLIGHTS PANORAMIC CAMERA 66" FOCAL LENGTH	FIRST FLIGHT- JAN 62 7 FLIGHTS PROBABLY A PANORAMIC CAMERA 24" TO 36" FOCAL LENGTH

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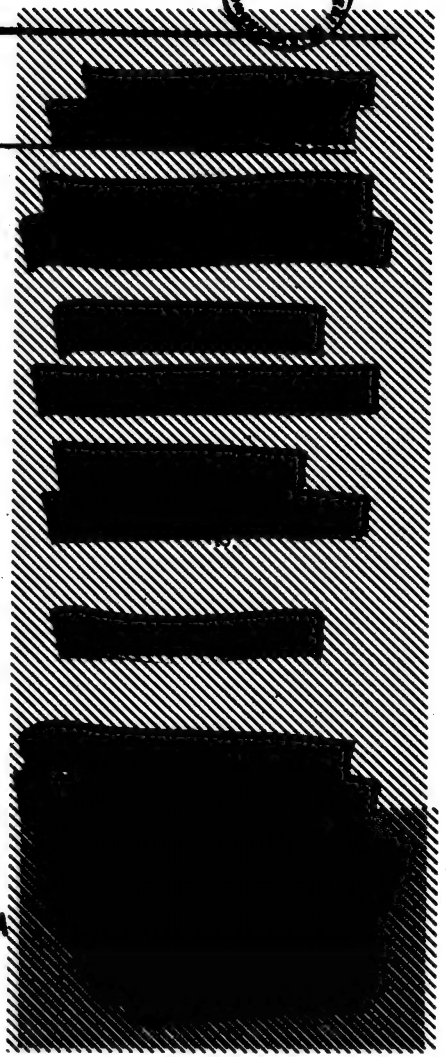

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FERRET SENSORS CAPABILITY

Library Dwight D. Eisenhower Texas

F-1

RECOGNITION OF CONVENTIONAL GROUND, NAVAL & AIRBORNE RADAR SIGNALS

LOCATION WITHIN 150 N.M. CIRCLE

ONETIME COVERAGE OF 60% -70% OF SOVIET BLOC

F-2

RECOGNITION OF KNOWN AND SUSPECTED SIGNALS

IMPROVED LOCATION ACCURACY

COVERAGE OF ENTIRE SOVIET BLOC EVERY FIVE DAYS

F-3

"FINE" LOOKS AT SIGNALS DISCOVERED BY GENERAL COVERAGE SYSTEM

"LOOKS" AT GIVEN SIGNALS FROM HORIZON-TO-HORIZON

FREQUENCY COVERAGE SAME AS GENERAL COVERAGE SYSTEM

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SAMOS OUTPUTS

Declassified

READOUT

READOUT TIME { VAFB STA ONLY - 25 MIN PER DAY
VAFB & NEW BOSTON STA - 53 MIN PER DAY

PHOTO E-2 (20')

PER MINUTE OF READOUT - 800 SQ MILES 90 FT
OF 35 M PRIMARY RECORD = 12 - 9½" X 18" PHOTOS

[redacted]

RECOVERY

PHOTO E-5 (5') PER MISSION - 4.9 MILLION SQ N MI

E-6 (8') PER MISSION - 9.0 MILLION SQ N MI

[redacted]

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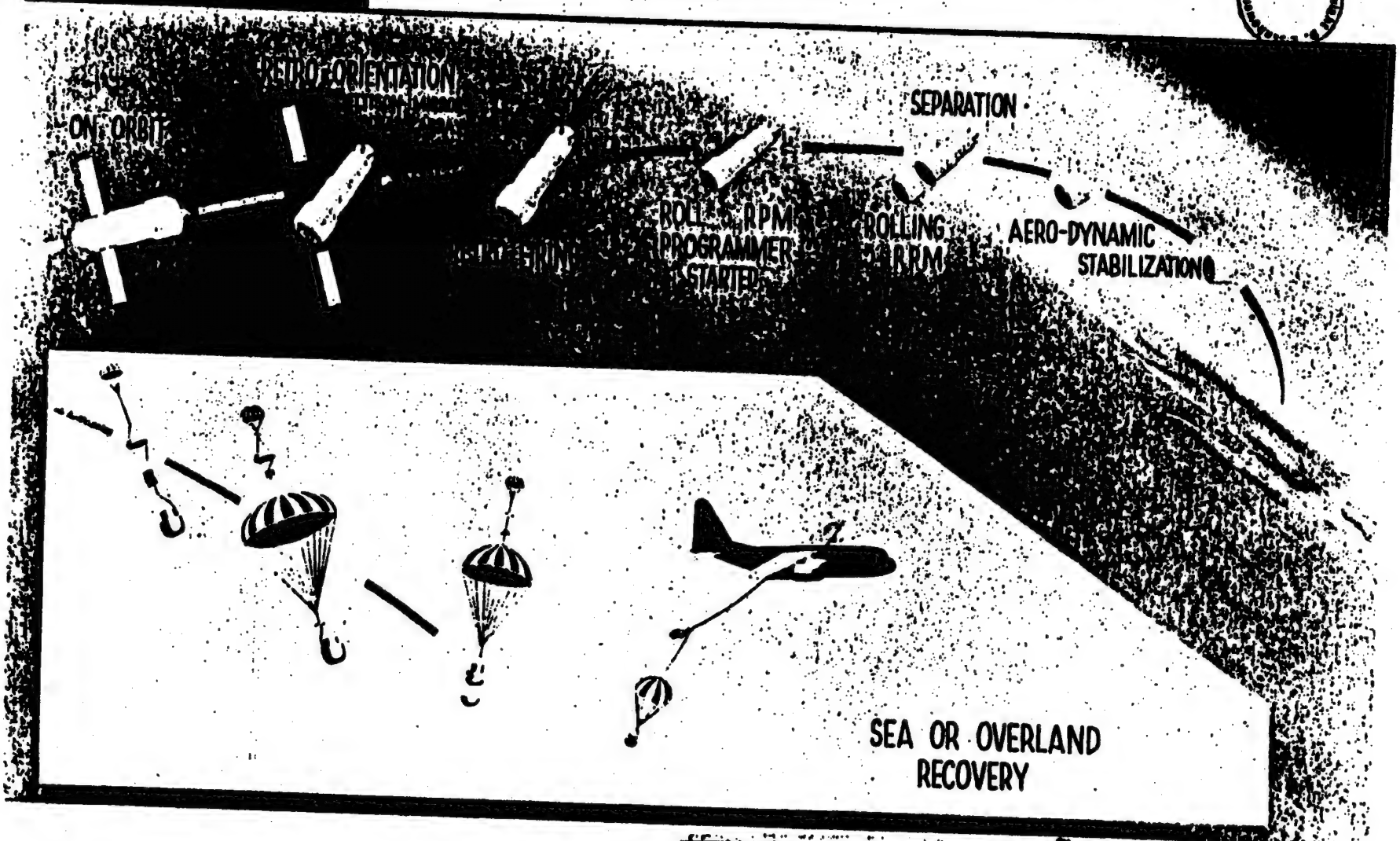
SAMOS E5 RECOVERY SEQUENCE



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Secret

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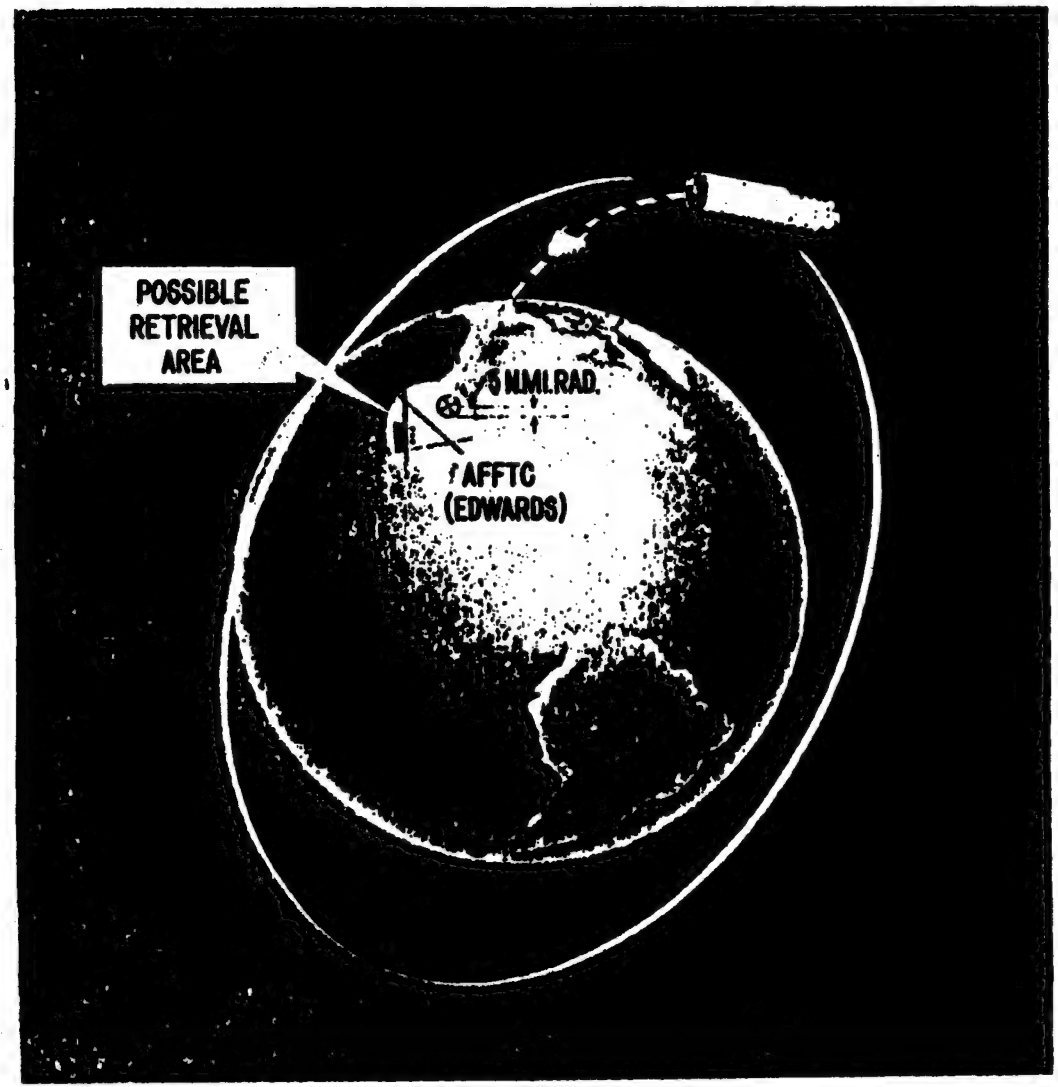
SAMOS E-6 — A NEW APPROACH



- RELIABILITY (SHORT LIFE)
- LARGE AREA COVERAGE
- HIGH RESOLUTION
- EARLY CAPABILITY
- PRECISE OVERLAND RETRIEVAL
- BROADENED CONTRACTOR BASE
- COMPATIBLE WITH DATA PROCESSING EQUIPMENT
- UTILIZE EXISTING GROUND FACILITIES

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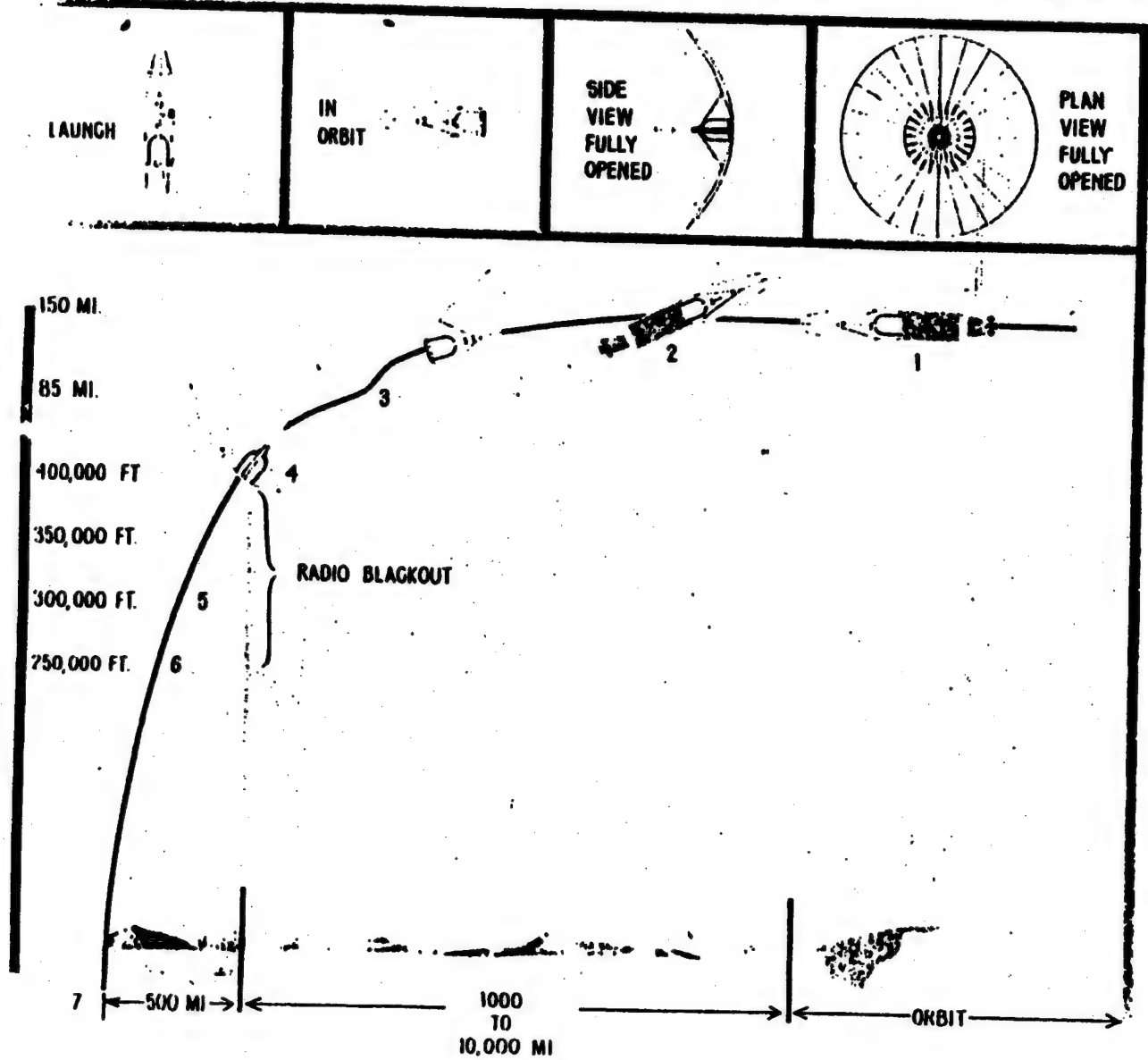
SAMOS E-6 – DRAG BRAKE RE-ENTRY SEQUENCE



1 VEHICLE IN ORBIT

2 REORIENTATION, RETRO FIRING & SEPARATION

3 MODULATE FOR RANGE CORRECTION

4 FULL OPEN

5 PEAK HEATING

6 PEAK DECELERATION

7 LANDING - 40 F.P.S.

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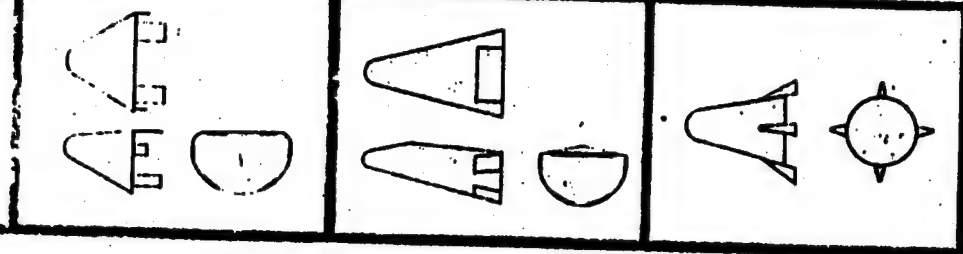
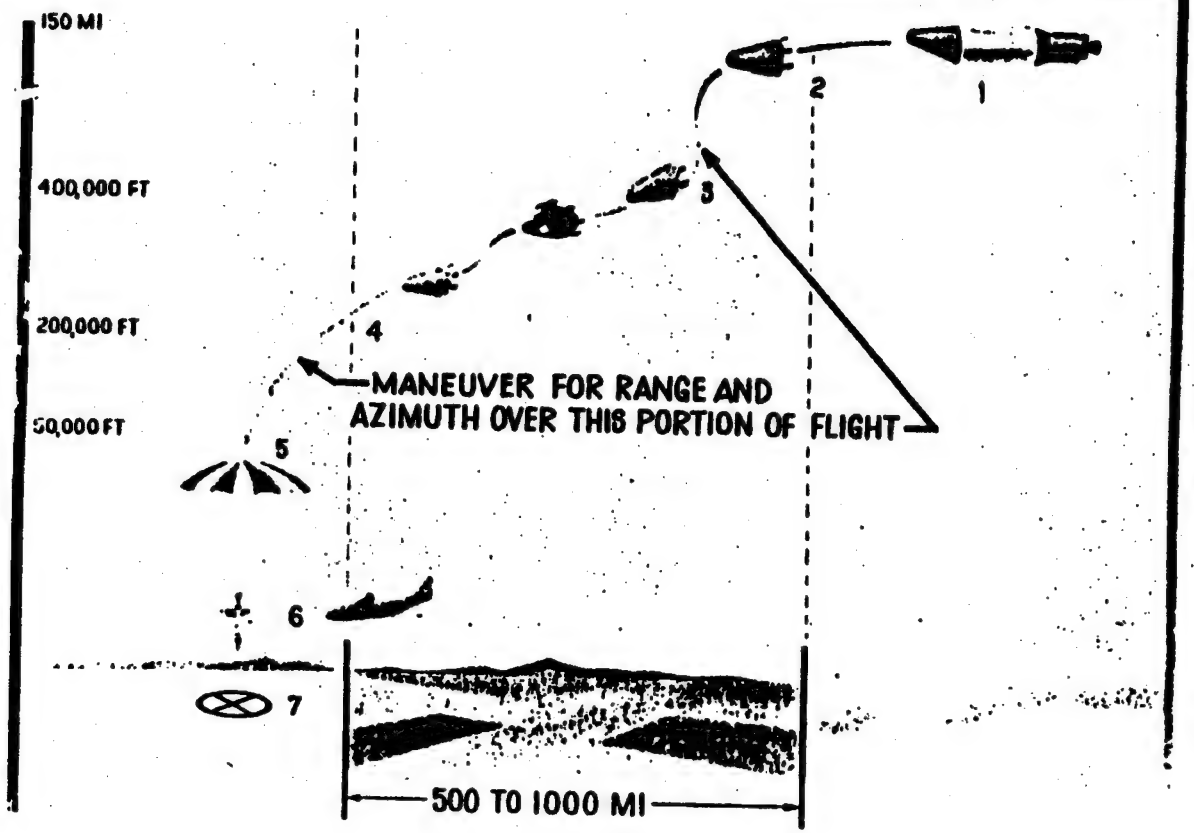
SAMOS E-6 - TYPICAL LIFT RE-ENTRY SEQUENCE

POSSIBLE SHAPES





1 VEHICLE IN ORBIT

2 RETRO-ROCKET FIRING AND SEPARATION

3 RE-ENTRY AND RADIO BLACK-OUT-START RANGE AND AZIMUTH CORRECTIONS

4 POST-BLACKOUT-MACH 15 COMMUNICATE FOR TERMINAL GUIDANCE

5 PARACHUTE OPEN-MACH 0.6 TO 1.0

6 AIR PICKUP ATTEMPT POSSIBLE

7 IMPACT - 25 F.P.S.

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INTERIM READOUT R&D DATA FLOW

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SECURITY CONTROLLED
WITHIN R&D FACILITIES

[redacted]

35 MM PRIMARY RECORD
AND FERRET MAGNETIC TAPE

VIA ARMED FORCES OR SPECIAL COURIER

[redacted]

T&A
STATIONS
VANDENBERG AFB CALIF
NEW BOSTON NEW HAMPSHIRE

TRACKING DATA VIA 100 W/M TT

STC
SUNNYVALE, CALIF

COMMAND & CONTROL | DATA PROCESSING

EPHEMERIS

FEEDBACK

[redacted]

PHOTO-RECONSTRUCTED & TITLED TRANSPARENCIES & PRIMARY RECORDS (SINGLE MASTERS FOR SUBSEQUENT DUPLICATION)

FILM PROCESSING ORGANIZATION "DUPLICATING"

REPRODUCTIONS AS REQUESTED & DISTRIBUTION TO USERS

FERRET TABULAR PRINTOUT OF INTERCEPTS

[redacted]

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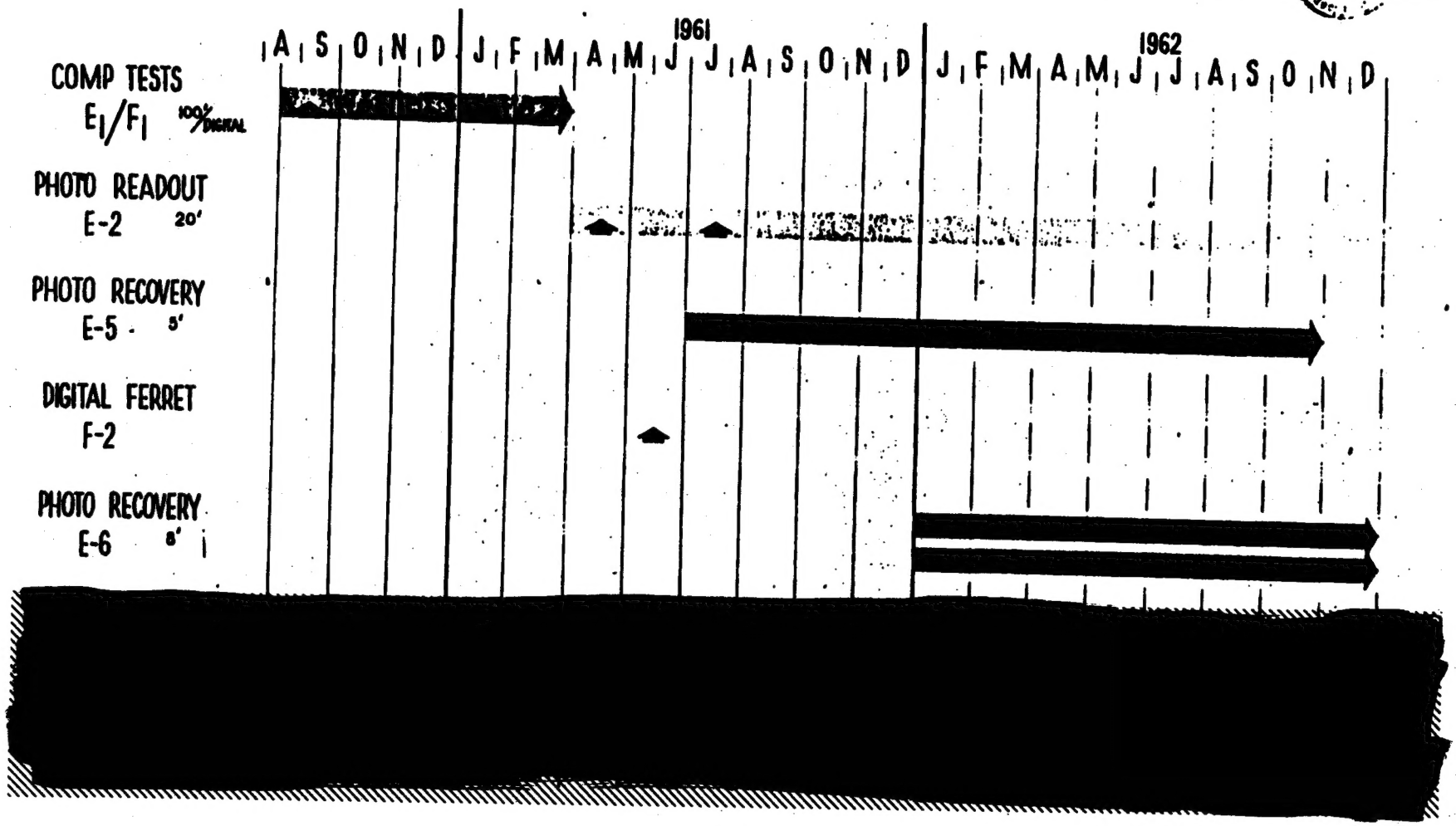
SAMOS LAUNCH SCHEDULE

11 AUG 60 DEV PLAN



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* DIAGNOSTIC FLIGHTS

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SUMMARY

ELEMENTS OF SAMOS RESEARCH AND DEVELOPMENT PROGRAM

- RECOVERY
  - E-5 PHOTO 5' RESOLUTION ——— 7
  - E-6 PHOTO 8' RESOLUTION ——— 7
  - DIAGNOSTIC RECOVERY ——— 4
- READOUT
  - COMPONENT TESTS PHOTO-ELINT E-1/F-1 – 3
  - E-2 PHOTO 20' RESOLUTION ——— 2
  - F-2 ELINT DIGITAL ——— 1

24 PLUS 5 UNASSIGNED
ATLAS/AGENA(THRU 1962)

- SPECIAL COMPONENT TESTS
- LAUNCHINGS FROM PT. ARGUELLO
- TRACKING STATIONS
  - VANDENBERG AND NEW BOSTON, INCL. READOUT
  - HAWAII AND ALASKA VHF ONLY
- CONTROL – SATELLITE TEST CENTER – SUNNYVALE
- DATA PROCESSING
  - DEVELOPMENT LABORATORY – DENVER
  - INTERIM PROCESSING OF R&D TAKE – SUNNYVALE
- RECOVERY CENTER – HAWAII

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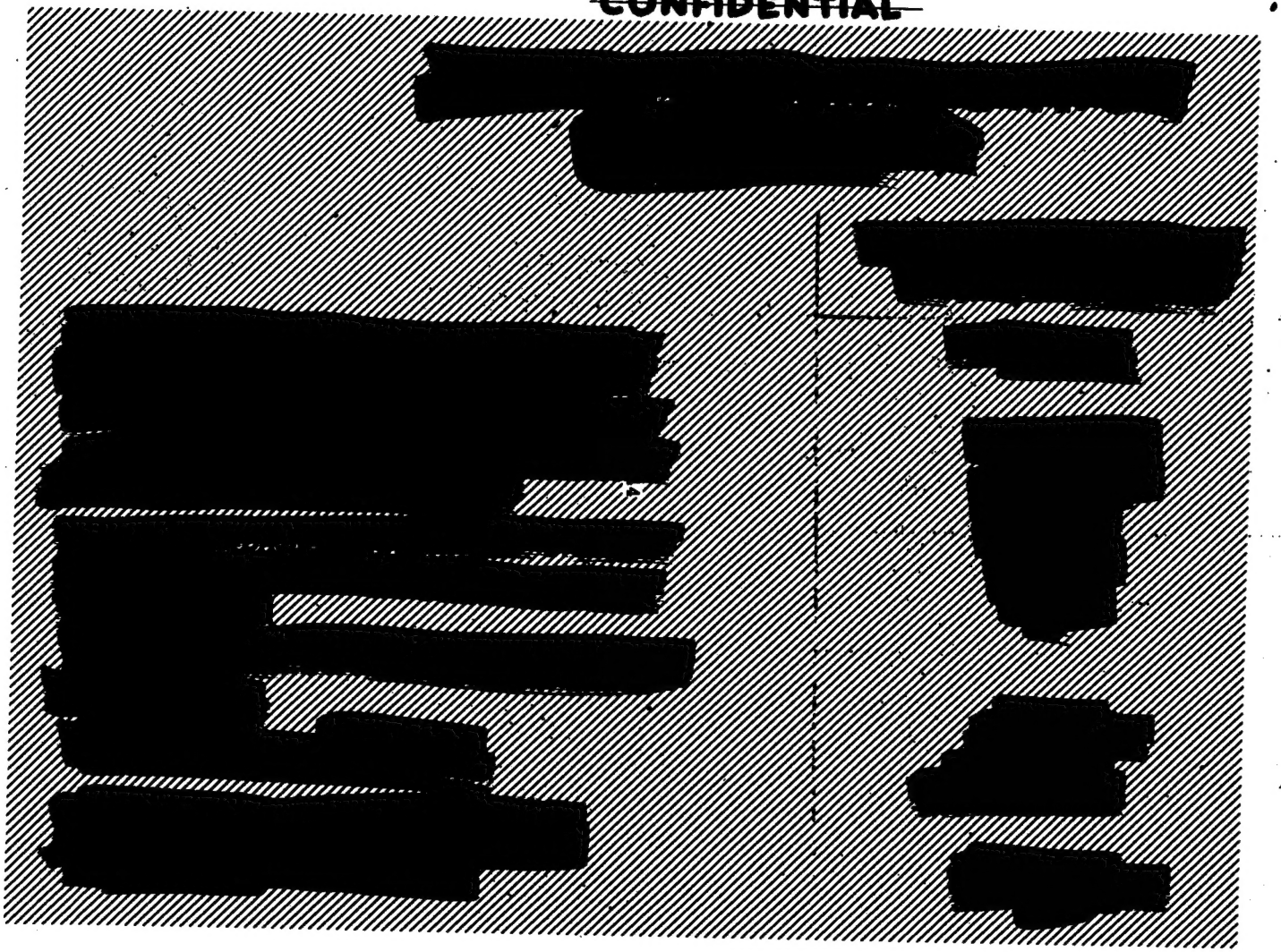

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